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PHILOSOPHICAL TRANSACTIONS.

Received in 1765.

I. *A monstrous human Fœtus, having neither Head, Heart, Lungs, Stomach, Spleen, Pancreas, Liver, nor Kidneys.* By Claude, Nicholas Le Cat, M. D. Professor and Demonstrator Royal in Anatomy and Surgery; perpetual Secretary to the Academy of Sciences at Rouen, F. R. S. &c. Translated from the French, by Michael Underwood, Surgeon to the British Lying-in Hospital, in London.

Read December 1766, **M.** F****, a chair-woman, in and January 1767. **M.** the parish of *Carville de Dernetal*, aged thirty-four years, was brought to-bed, at nine months end, on tuesday the third of january, 1764, of two children, having already had six.

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B

This

This last labour, in which she was attended by the widow *Mauger*, a midwife of the same town, began with so considerable a discharge of water, that it was judged, not without reason, that her pregnancy was attended with a dropsy of the *uterus*.

The first child was a girl, well formed, who died in the birth, solely from the obstacles which were occasioned, during the course of the labour, by the second child, or monster, which I am going to describe.

All the lower part of this child, from a finger's breadth above the navel, was likewise a female, tolerably well formed, except that on her left foot she had but four toes, joined together by a membrane, like the web of a duck's foot.

But all the parts of this foetus, above the navel, composed a perfect *mola*, a shapeless mass, represented in the two following figures, of which it will be necessary to read the explanation, in order to have a just idea of the external appearance of this monster.

The drawings are reduced to almost half the natural size, both as to length and breadth; from whence it may be observed, that each of the children, who had lived to their full time, had acquired, in this dropical womb, a bulk pretty near equal to that of other children, born at full time, when twins, and not very thriving. The full size of our monster was twelve inches six lines, and the navel was in the middle of this space.

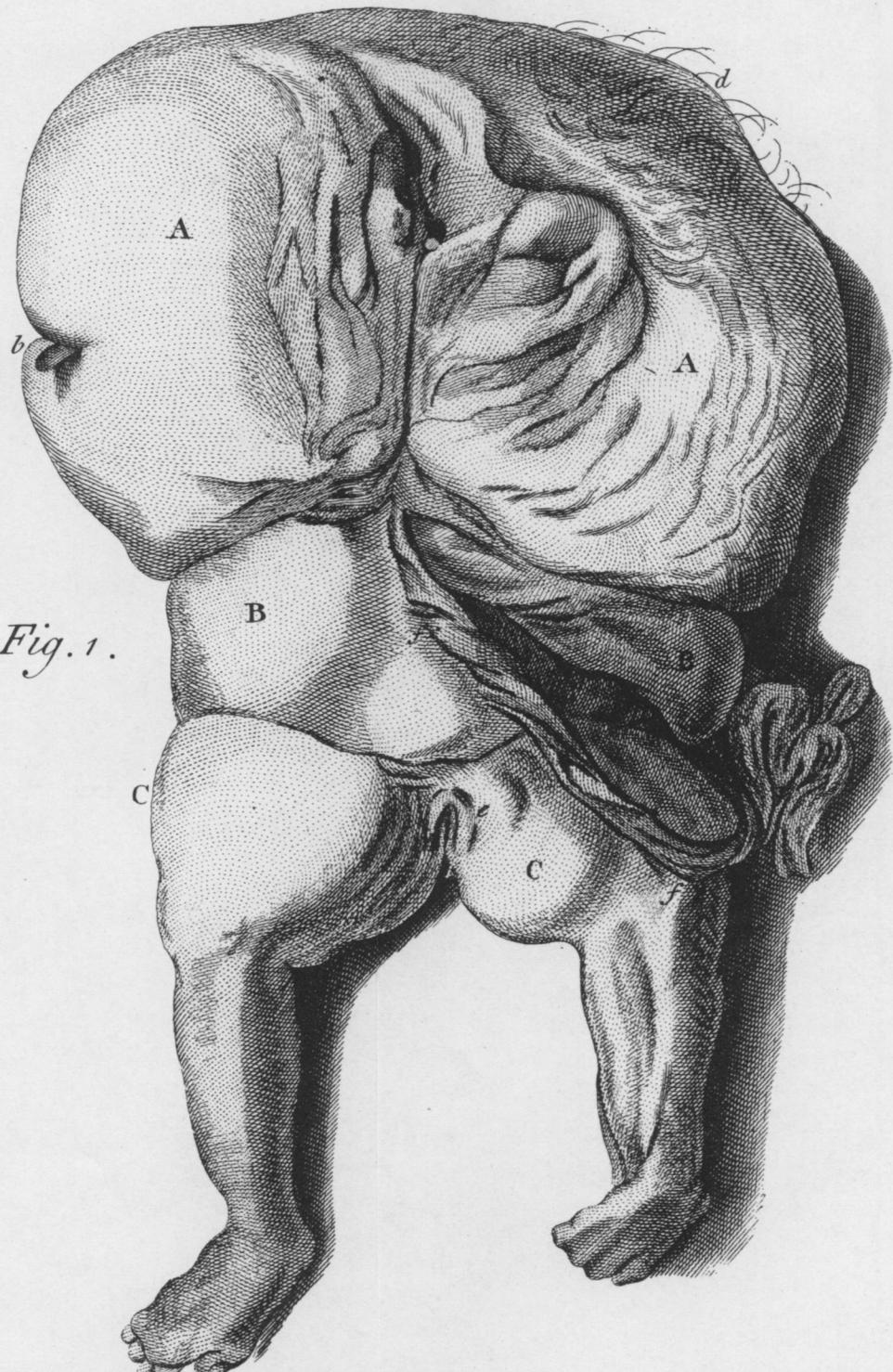


Fig. 1.

Drawn by M^r David daughter to the Author.



Fig. 2.

T A B. I.

F I G U R E I.

Represents the monstrous foetus in a front view.

- A. The upper and only monstrous part, which seems to contain its head, its superior extremities, and the breast.
- B. The belly.
- C. The lower extremities.
- a. Solid and bony eminences, which appeared to be portions of a jaw. without any opening for a mouth.
- b. The extremity of the thumb of the right hand.
- d. The hair, the same as on other children.
All the surface of this bag was like the skin of any other foetus.
- e. The genital-parts of a female.
- f. The *umbilical* cord.

F I G U R E 2.

Represents a back view of the foetus.

- A. The same bag as at letter A. fig. I.
- B. The loins.
- C. The lower extremities.
- a. The hair as seen in the former Fig. under which might be felt the bones of the *cranium*.

B 2

b. A

- b. A transparent vesicle, like an *hydatide*, which I took for an imperfect eye.
- c. Part of the bag, where we observed the extremity of a thumb seen at b, fig. 1.
- d. Part of the same bag, which resembled that marked c.
- e. Under this region might be felt the *spina dorsi* and *colli*.

Description of the internal parts of this monster.

I began the dissection on the hind part; the muscles of the back were well formed. I found on the right side eight ribs, reckoning from below upwards, and seven on the left. Immediately above these was an *hydatide*, in which lay the cervical nerves, destined for the upper extremities. In this place also might be seen very imperfect rudiments of the *scapula* and *clavicle*.

On the right side, and near to those rudiments, was a sort of thumb, easily known to be the thumb of the right hand, whose extremity projected beyond the integuments three-fourths of its natural length.

Above, and on the right side of this *hydatide*, I discovered another more considerable, surrounded by a large bag, very smooth on the inside, and supported by something, which had the appearance of a beginning of *maxillæ*.

At the extremity of the fore part of this bag were two orifices, almost contiguous, across a *septum*, which led to another bag of a much smaller size.

These two *hydatide* bags were behind that represented in Fig. 2. (letter *b.*) which I took for an imperfect eye, because it was transparent, and surrounded by teguments not unlike eyelids.

On tracing the *spine*, and divesting it of all the soft parts, we discovered that it terminated above in a bony mass, that resembled the *larynx*, above which was a large soft substance of the consistence of, and covered with, that kind of skin common to a cow's udder; on which we saw hair like that of other children. This occupied the usual place for the head.

Under this kind of *parenchymatous* substance, which was white and glandular, was a muscular mass, more considerable and conspicuous than one could well have expected in such a subject. It doubtless consisted of the *occipital* and perhaps *frontal* muscles, drawn towards each other.

Having raised this fleshy part, I opened the upper bag of the *spine*, resembling a *larynx*. Its surface was altogether bony, as usual in the foetus, viz. somewhat cartilaginous. This I opened in the direction of a membranous triangular line, somewhat like the *lambdoidal suture* of the *occiput*. We found this kind of *larynx* fitted with *cerebrum*, or rather *cerebellum*; it might be about a cubical inch in proportion; and this was all the brain of the foetus.

At the extremity of this cavity, backwards, lay the proper *medulla spinalis*. This cavity was not separated by an elongation of the *cerebellum*, it had but a very small *falk* forwards; and on the right side was another appearance of an elongation of the *cerebellum*,

cerebellum, so that this small portion of brain did most likely belong to the *cerebellum*.

At the basis of this kind of unformed *cranium*, forwards, was an opening leading to a small brown *hydatide*, situated on the right side, under a bone which had the appearance of a portion of the *maxilla*, which led towards a sort of mouth, scarce formed, and closed; it is represented at the letter (*a*) of the first figure. There was nothing on the other side, no appearance of a mouth, nor any thing that seemed the least like it.

I took this *hydatide* for an unformed jugular bag, or true *cæcum*; in the adjoining bone I found a kind of right ear.

The fore part of this same superior surface of the *cranium* was flat, but a little hollowed, like the upper surface of the *larynx*; in the middle was a considerable ridge, and on its anterior part appeared a prominence: thus this bone, which should have been similar to the two *parietals*, did not resemble them at all.

Underneath this prominence, the bone took a perpendicular turn, making a sharp angle with the upper surface, and forming a cavity in its descent, which terminated in a projection forwards; it was on the right side of this projection where the supposed right branch of the *maxilla* was attached; within that branch appeared the trace of the jugular above-mentioned, and very distinctly the nerve of the eighth pair.

In the breast, or rather under the ribs, were neither heart nor lungs, but the same white, *parenchy-matous* and *ædematous-like* substance, which we

saw in the place of the head. Below this was no *diaphragm*, at least no distinct one. In the belly, which extended itself just under the ribs, was a bundle of intestines, and a little red mass, which I called the liver, for want of a better name, because it seemed, that, when I pulled the umbilical cord, this substance moved, which induced me to believe that the umbilical vein entered there.

No stomach, spleen, pancreas, or kidneys were seen.

The intestinal mass was divided into two portions. The first was of a reddish colour, which terminated upwards in a blind pouch, and below joined the other portion, as the *ileum* does where it unites with the *colon* and *cæcum*. This second portion was white, and seemed to include the large intestines. The *cæcum* was very long, or rather the *cæcum* and its *appendix vermi-formis* were of the same size.

Thus, there was neither *jejunum*, or *duodenum*, or stomach, or any liver properly speaking: for that, which I found in the place of it, was a red *viscus*, and of the *conglomerate* kind, like the kidney in a foetus. Having cleared it from all its adhesions, I discovered neither vessels analogous to those of the *sinus* of the *vena portæ*, or any thing that resembled the figure of the liver, or of any of its appurtenances: I opened it, and was more and more convinced that it was rather a kidney, or knot of renal glands, than a liver, although it was one mass, and placed in the midst of the intestines; it had still less the resemblance of a heart, having no cavity, no vessels, or any muscular fibres.

The

The extremity of the *colon*, or the *rectum*, passed betwixt the bladder and the *uterus* as usual. I dissected all these parts, and traced the bladder up to the umbilical cord, where it lengthened into a pipe, and formed an open *urachus*. It had not the pyriform shape of the common bladder.

It was in making these dissections of the *kidney-liver*, and those of the *pelvis*, that I divided the principal vessels, which I shall mention in the second examination.

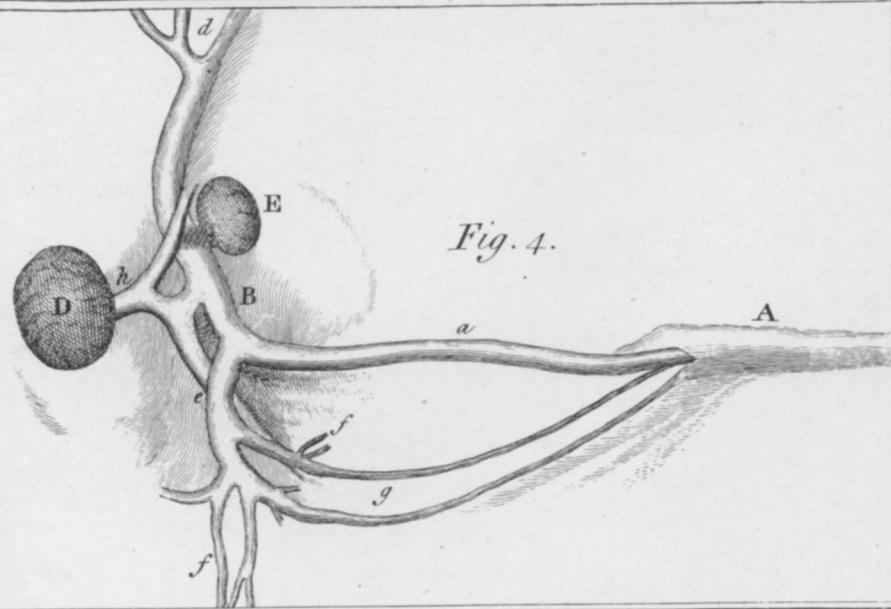
All these intestines, and especially the *rectum*, contained excrements of a light ash colour, but no *meconium*.

The bladder, although lengthened and continued by an *urachus*, as high as the navel, opened in the usual place betwixt the *nymphæ*.

The *anus* was imperforate, and the *rectum*, immediately under the *uterus*, terminated in a blind pouch, attached to some membranes that went to the *anus*. This pouch was quite full of that sort of excrement just now described.

Second examination, made the next morning.

I had confined myself, in the first examination, to the singularity of a want of head, lungs, and heart, and of the existence of nerves, notwithstanding these defects. In this second review, the organs of the circulation in such a production, which had lived nine months, raised my curiosity; but it was rather too late for my intire satisfaction, for I had not taken care enough to preserve the internal parts, imagining before-hand that they resembled those of



of two headless twins, in my possession, whose inside was entirely similar to that of other foetuses. I discovered, notwithstanding, the following things, and I have represented the most essential in a rough sketch seen in figure 3.

FIGURE 3.

A. Is the region of the breast, whose internal surface was lined with a membrane, which I took to be a *diaphragm* thrust back and stuck to the *pleura*, because it arose from lumbar muscular portions resembling the pillars of the *diaphragm*.

Under this species of midriff was a very regular distribution of arteries and nerves, which I neglected to delineate, as thinking it useless; I contented myself with dissecting the *aorta F.* of which the upper ramifications were as usual.

B. is the lumbar region.

C. Those of the *osseous ilia*, and of the *pelvis*.

D. The *umbilical* cord passing through an opening across the teguments of the lower belly, to be brought into view.

E. The intestines.

F. The *aorta superior* before-mentioned.

G. H. The integuments of all the right side, opened on the back, to preserve it whole, and also those of the belly; they are thrust to the right side to give a view within.

- a. A kind of single kidney, which occupied the place of the liver. The principal part is covered by the intestines. It received several small vessels from the *aorta*, but none of them was near so large as the *emulgent*.
- b. A small lobe, that might pass either for a small lobe of the liver, or for a *capsula renalis*.
- d. An orifice of a vein, which was also ramified, through the *kidney-liver*, by branches as fine as those it received from the *aorta*. But this vein did not terminate there.
- r. It sent, upwards, branches to the muscles, to the *vertebræ*, and thence to the ribs; for, by blowing into the trunk, the air came out at the origin of the uppermost rib I had dissected.
- z. Below, it formed two large *iliac* veins, g. which took the usual course.
- e. The trunk cut, belonging to the *aorta inferior*, of the length of a line.
- f. The distribution of the rest of this *aorta*, or right *iliac*, through that side of the *pelvis*.
- g. The *iliac* veins going off to right and left, as usual.
- b. The orifice of the *umbilical* vein, being so exactly of the same diameter, of the same white colour and strength, and of the same consistence with the divided trunk, e. that at first sight, I took this for the same vessel. The trunk, d. was much thinner, and of a more bluish tint.

Under the *umbilical* vein, *b.* was the *umbilical* artery on each side, which went as usual into the *pelvis*, and there sent off the ordinary ramifications.

On the right side, its *anastomosis* with the *iliac* artery was very discernible; but on the left we could not discover the *iliac*, a vessel which is pretty considerable, even in the *foetus*, and was so on the other side, as seen at letter *I.*

On the left side; the *umbilical* artery, at its origin, or its inflection, had a kind of web of arteries subdivided, some of which, doubtless, communicated with the *aorta*, or right *iliac*; but neither of these branches appeared to be near the size of the right *iliac*, nor could we find any thing any-wise like to the trunk, *e.* which I long suspected to be the trunk of the right *iliac*.

What vessels then are these trunks, *d. e.?* Which of the two is the continuation of the *umbilical*, *b.?* This is a very important point, but not easily determined. It would not have proved so, if I had injected the *umbilical* vein, as I generally do in all my monsters; or if I had taken more care of the parts about the *kidney-liver*, which I certainly should have done, had I but suspected so many singularities.

I said, that at first sight, I took the trunk, *e.* to belong to the *umbilical* vein, and it is still an opinion, to which I am inclined, for the following reasons.

1. At this part, *e.* the *aorta* had its greatest circumference; and, in tracing it from this trunk, above as well as below, it grew less and less. This was, therefore, its trunk, or origin, and could not be a branch of it.

2. I have already said, that the mouths, *b.* of the *umbilical* vein, and, *e.* of the *aorta inferior*, were exactly of the same diameter, of the same white color, and of the same strength; and that the other vessel, *d.* was much weaker, of a laxer texture, and of a somewhat livid color, like the coats of the veins.

3. The *umbilical* vein is, with respect to the mother, or to the *placenta*, which transmits the blood to the foetus, a real artery, going from the center to the circumference, or from the principal body, which is the mother, to an adjoining organ, which is the child; and the *umbilical* arteries are properly veins, which return the blood from that adjoining body to the common center of the grand circulation. The blood from the *umbilical* vein then is truly an arterial blood to the foetus. In the usual structure of the *embryo*, nature has shortened all the ways, to bring the arterial blood of the mother more speedily into the heart, into the very *aorta inferior* of her foetus. Therefore, in a subject, where there is no heart, or even liver, that vein ought to communicate immediately with the *aorta inferior*. In this manner one conceives how this subject could do without a heart, the *umbilical* blood being a continuation of that from the arteries of the *placenta*, the *uterus*, and in short of the mother; the impulsion of the maternal blood was propagated by that *aorta* through all its ramifications both above and below. In one word, the heart of the mother supplied that of the foetus, and the circulation in this was a continuation of that of the mother. These are the reasons inclining me towards that first opinion; and here are those that suspended my judgment for some time in favor of the supposition of a

of a communication of the *umbilical* vein with the trunk, *d.* of the *vena cava* of the foetus.

1. In every foetus the *umbilical* vein empties itself into the *vena-cava* in the liver; therefore nature hath here followed her usual course.

2. With regard to the arterial trunk, *e.* it is close by the division, *g.* of the *Iliac* vein, whence it is very likely that it was the left *iliac* vein which was divided.

This last, and above all striking reason, made me employ almost a whole morning, in looking over and over this left *iliac* region, to discover the divided vessel, which would have put the whole matter out of dispute; but I could find no trace or appearance of it. All the vessels communicating with the left *umbilical* vein appeared very intire, though deprived of part of their ramifications by which the air escaped, but all grew in their course less and less in diameter. Which then was the origin of this left *umbilical* artery? doubtless the branches of the trunk, *f.* of the *aorta*, which were numberless in the *pelvis*, but had partly been spoiled the preceeding night, in dissecting the *rectum*, *uterus*, and bladder of this monster. I add, that this trunk, *e.* was joined to some membranes, which we were obliged to pull about, in order to make it turn to the left, and this direction appeared not to be its natural position.

Be it granted, for a moment, that, *e.* is the left *iliac*, and that the *umbilical* vein joins it at, *d.*; how could the blood circulate in this foetus? How could it have lived the nine months? *d.* is evidently a trunk of the *cava*, which generally enters the right auricle of the heart, dividing, like this, into the

cava superior, *d. b.* which rises by the *vertebræ* up to *F.* and into the *cava inferior*, *d. g.* 1. It would be absurd to place the only moving power of circulation in the *vena cava*, or indeed in any vein. 2. When you have placed it there, what will this supposition tend to? 3. This vein subdivides, and ramifies itself through the *kidney-liver*, the muscles and the spine; but none of its branches communicates with the *aorta*. The *aorta* on its part sends several branches into the *kidney liver*, very slender, and resembling, by their transversal direction, the common emulgents, but very different in size. If then the circulating force were placed at *d.* it could only produce an inverse circulation, by the communication the *cava* might have by its capillary branches, with the like ramifications of the *aorta*, which supposition seems too much against nature to counterbalance the other opinion, which makes the trunk *e.* of the *aorta*, a portion of the *umbilical* vein, and the substitute of the heart.

Another anatomical fact proves this last opinion; which is, that the *aorta*, and especially the superior, *F.* ran up as high as the *cranium*, and was of a pretty considerable size, while the venal trunk, *d.* had nothing but capillary branches in the upper parts; so that it almost appeared evident that the vessel, *e. F.* was connected with the chief mover of the fluids. Wherefore, supposing the trunk, *d.* to be the *vena porta*, or an imperfect *cava* going to some of the *viscera*, being the rudiments of an imperfect heart, or a *vena-cava* ending in a pouch, as the intestines did which should have entered the stomach, if there had been one; the difficulty almost disappears. I say almost, because, even on this supposition, if there was a circulation

tion in this monster ; we must admit some *anastomoses*, between the arterial and venal system, which supplied those found in other foetuses ; since the venal blood must in some place or other re-enter the arterial torrent. Such might be the *anastomosis*, K. fig. 4.

For, by this hypothesis, the vascular system of this subject would be represented by fig. 4. in the following manner.

A. The *umbilical* cord.

B. The intestinal tube.

D. The kidney-liver.

E. A sort of *glandula renalis*.

a. The *umbilical* vein ; the great mover of the fluids.

b. The *aorta*, a continuation of that vein.

c. d. *aorta superior*, accompanied by the *vena-cava*.

e. *Aorta inferior*.

f. The distribution of the *iliac*.

g. The *umbilical* artères, making a part of the distribution.

b. The trunk of the *venæ-cavæ* coming either from the *portæ*, or from the *viscus D*, or forming a blind pouch in that part. Some traces of the *vena-cava superior* appear towards C.

I. The *cava inferior* going to form the *iliacs*.

K. A necessary *anastomosis* between the two kinds of vessels, arteries, and veins. I place it in this conspicuous situation, though it might have been any where else.

I repeat

I repeat it again, if I had but suspected so many singularities, what I now can give only by way of conjecture, might have become demonstrable in fact. It is scarce probable that I shall ever have such another opportunity; but it is more so, that it may offer to some one among the great number of the literati in Europe, who read the Philosophical Transactions. This was the principal motive that determined me to present this observation, though imperfect, to the Royal Society. Why should we hesitate to make a publick acknowledgement of our faults, when our brethren may profit by, and amend, them?

Another motive, which engaged me to offer this observation, such as it is, was, that even the imperfection of it does not affect the useful consequences deducible from it: for, whatsoever may have been the disposition of the blood-vessels of this monster, it is a fact absolutely certain, that it had no heart, nor any other *vicus* in the place of it; and that the circulation of the fluids, which appears to have taken place from the existence of the principal arteries and veins, could not have had any other moving power than the circulation of the mother itself. Hence this child, monstrous as it is, demonstrates the circulation of the blood from the mother to the *fœtus*, and from the *fœtus* to the mother again; which some moderns deny, and others endeavour, at least, to render doubtful. I presented to the Academy at Rouen some years ago, several observations which favoured the antient system; the present comes to their support, to give this excellent hypothesis of Harvey all the credit it deserves.

The

The child I speak of had no mouth, *oesophagus*, nor stomach, thus it could not, by that usual passage, be nourished from the waters that surrounded it; it could not absorb from the surrounding fluid wherewith to fill its vessels, and supply its growth. It, therefore, follows that it received both its arterial and alimentary fluids from the mother by the *umbilical* cord, and that it owed every thing to that circulation, which some would attempt to annihilate.

In the intestines of new-born children we find a black excrement, called *meconium*; this black pulp can receive its color only from a bile thickened by retention, and poured directly from the *ductus choledochus* into the *duodenum*. Now this foetus, having no liver, nor gall-bladder, &c. could have no *meconium*; therefore the pulp found in the intestines was of an ash-colour.

This monster had so little brain, that that *viscus* must have been of small import towards the functions of this animal. And yet all these brainless foetuses are very lively. Mr. Denis, who, in his twelfth conference, has given an account of one of them, and M. Vaissiere, who sent me one from Toulouze, the last year, both remark, "that these children " are remarkably lively in the mother's belly; " that they were in violent motion, at the time " of labor; that the moment they were in the " world they seemed suffocated, and became all at " once motionless." This is a matter worthy of much reflection.

How can we conceive there can be sensation and motion, without almost any brain in one of these monsters; and absolutely without any in the other?

Sensibility, sensations, and passions, may exist without the brain, and have their seat in its *meninges*, and in the coats of the nerves formed by those *meninges*. If I had not endeavoured to prove that point in my physiology, and lately in my dissertation on the sensibility of the *dura* and *pia mater*, the observations of children and animals born without brain, which are pretty considerable in number, would demonstrate it by facts.

That these children are more lively, that is, more sensible, I attribute to their having little of the nervous juice, though not less of the active fluid. This nervous juice I termed *fluide conservateur*, the preserving fluid, in my physiology. It is long since I have observed that an abundance of this nervous juice produces the contrary of vivacity; and, as a consequence, of our principles, long sleep, or rigid continency for a length of time, renders us heavy and benumbed, because in each of these circumstances, this nervous juice abounds and regurgitates, if I may so speak.

But these violent motions, whence have they their origin? there must be a nervous juice, to act in the muscles, and here we have very little.

Neither of these animals was deprived of the *medulla spinalis*, and one of them had a small portion of brain, or *cerebellum*. This is one source of the nervous juice, and of the active fluid, necessary to muscular motion. This source, I grant, is weak and poor, but I have made it appear in my treatise on this subject, which obtained the prize from the Academy of Berlin, that there is in the blood a richer store, which the nervous fluid unites to, and makes

makes use of, in muscular motion. We explain by this, how it happens that an ass, who has so much less brains than a man, is, notwithstanding, so much stronger, because it has much more blood.

Here then is a second spring that affords these monsters a considerable supply; but though sufficient for their motions, it is not equal to that of an ordinary foetus, and the violent agitations of their body arise from their great sensibility, which we have just now accounted for. Now, the blood in the foetus, and especially in these, belongs to the mother; they are furnished by her, as well with air, as with the nervous juice, and the animal fluid, which are essential to her. Wherefore, as soon as these children are separated from the mother, and deprived of that vital source, all motion must cease in them, as if they were suffocated, that is, as in any other suffocated foetus.

Let us conclude this account by a word or two on the cause of these monsters.

The great quantity of waters voided by the mothers of these children, proves that the principle of their monstrosity is a disease, a sort of dropsy, and even a kind of *hydrocephalus*, which had run off a considerable time before the labor.

The two *hydatides* I found at the origin of the *brachial* nerves, and which had evidently been the cause of the mutilation of the upper extremities, are examples that help us to comprehend that of the other organs. On supposing a like disorder on the origin of other nerves, which have their rise from the brain, it will be obvious that the organs, to which these nerves run, that is, where they convey the nervous

fluid, which contain the rudiments of every part, will be wanting. It may indeed be said, there are *hydrocephali* that have all the organs very well formed: but there the disease has commenced after the perfect formation of these parts, whereas if you suppose it to have happened in the very time of that formation, you will see that the nervous juice, vitiated, diluted, and turned out of its natural course, can no longer be employed in the generation of those organs.

Those who have attended my courses, and have read my physiology, will be pleased to see that all these mysteries, which one would have thought impenetrable, are easily accounted for upon the principles I have laid down.